MILWAUKEE SCHOOL OF ENGINEERING

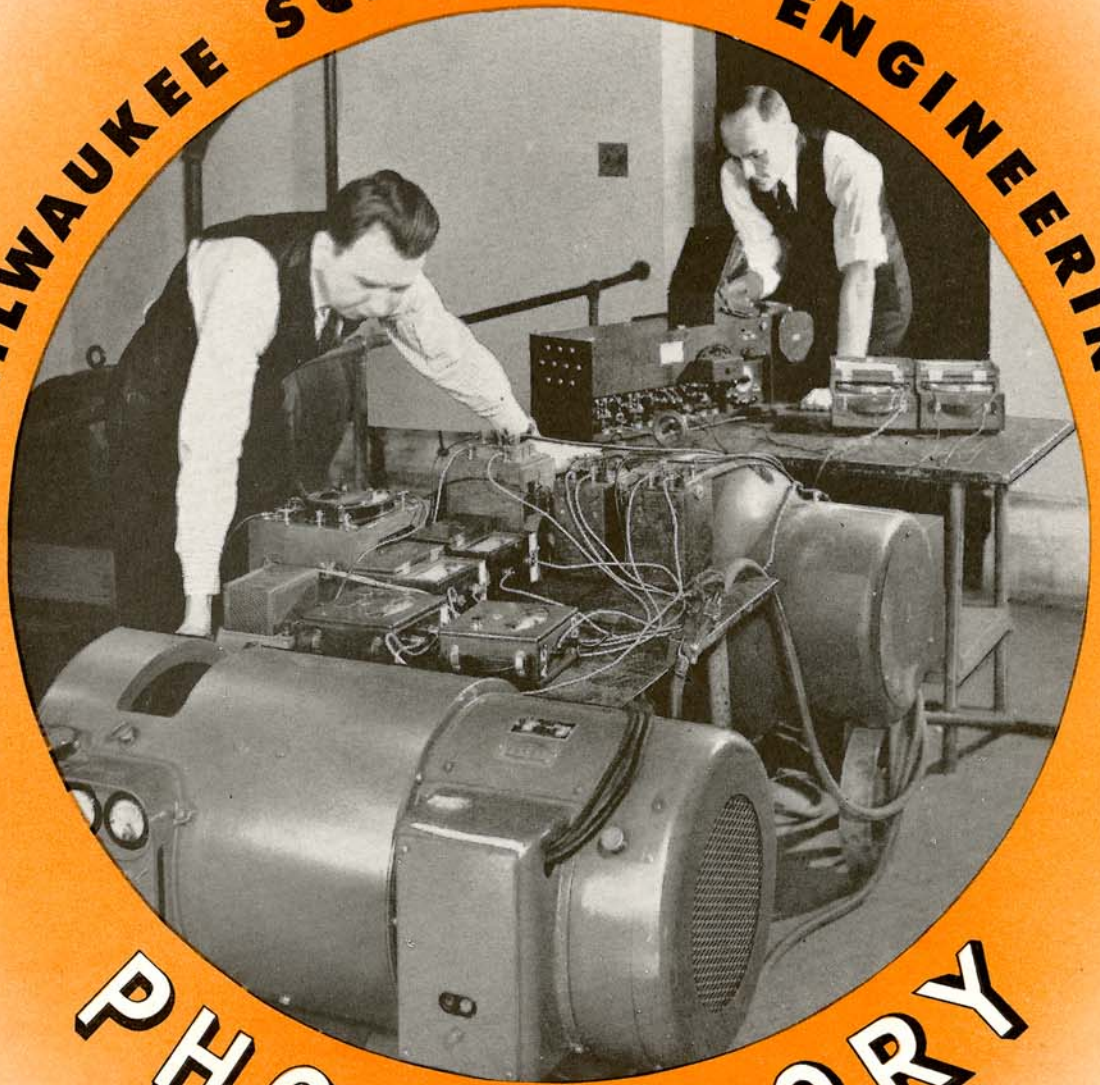
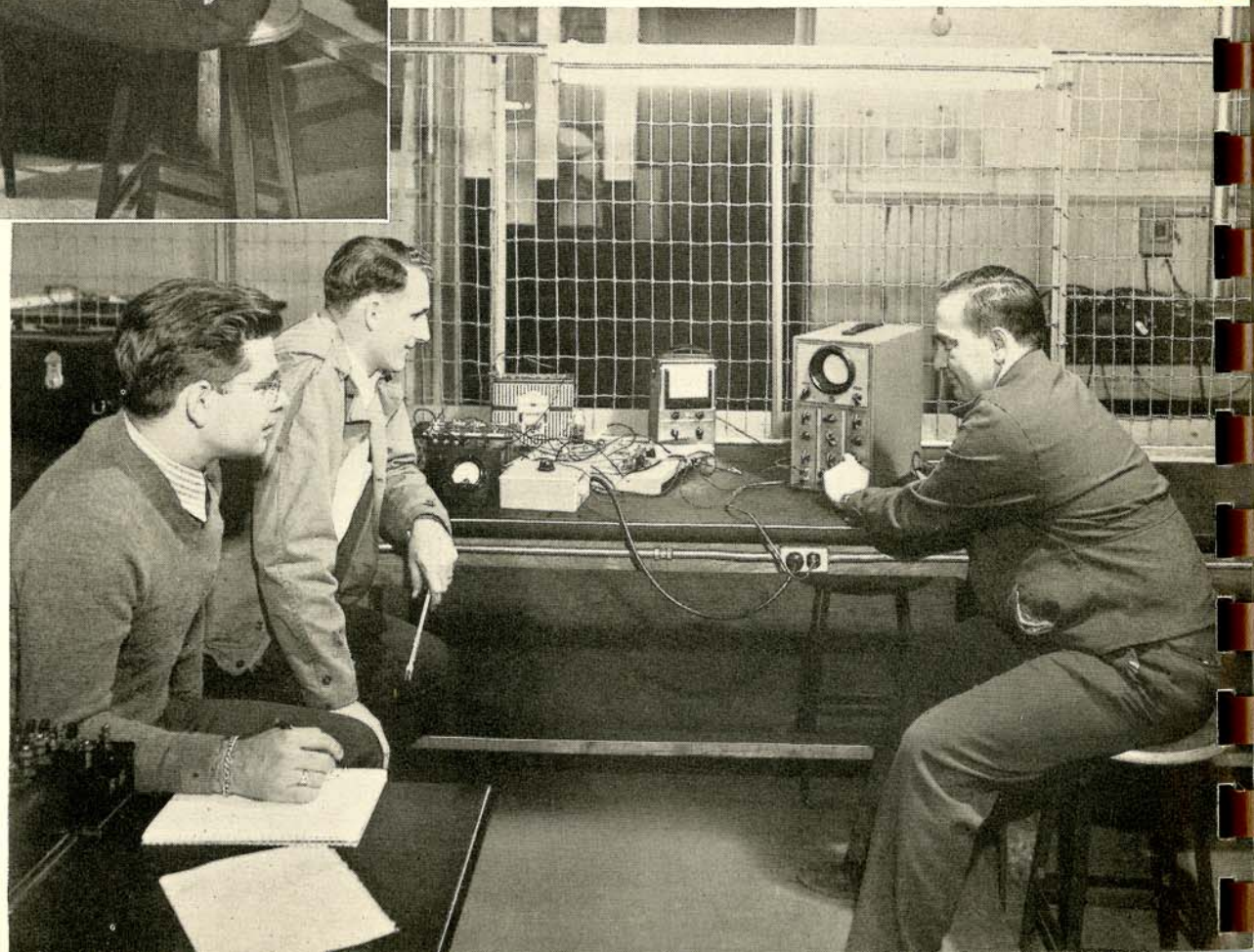


PHOTO STORY

Voltage Regulation Tests

The student who is majoring in the field of electronics performs many experiments to aid him in understanding the various phases of theory. The picture shows students at work on an electronic voltage regulator, running a test on a circuit which compensates for variations of line voltage. The output of the generator is connected to the grid circuit of the controlled rectifier in the proper polarity, so that any decrease in the output voltage of the generator causes an increase in the current flow from the rectifier to the field winding. This increase in field current compensates for the original decrease in voltage.

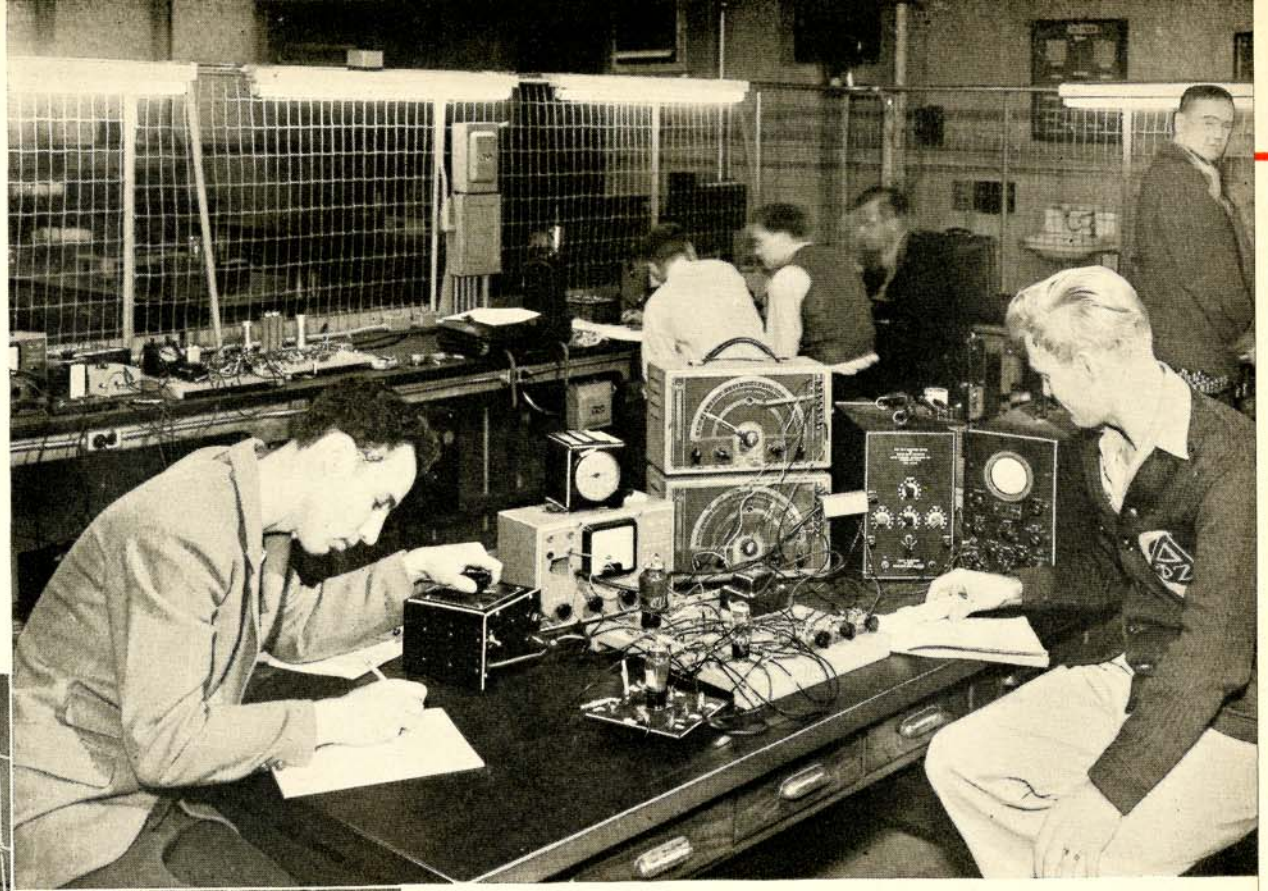


Investigating Time Delay Circuits

In the picture opposite the students are performing an experiment to study the time delay action of an electronic circuit. Time delay is being employed in the operation of a relay. Basically the experiment proves this fact: if the voltage across the capacitor is used to operate a relay, the relay will close only after a definite time has elapsed after the charging begins. By using the voltage developed across the condenser as part of the bias of the vacuum tube, the relay can be operated by the plate circuit of the tube without affecting the condenser time delay circuit.

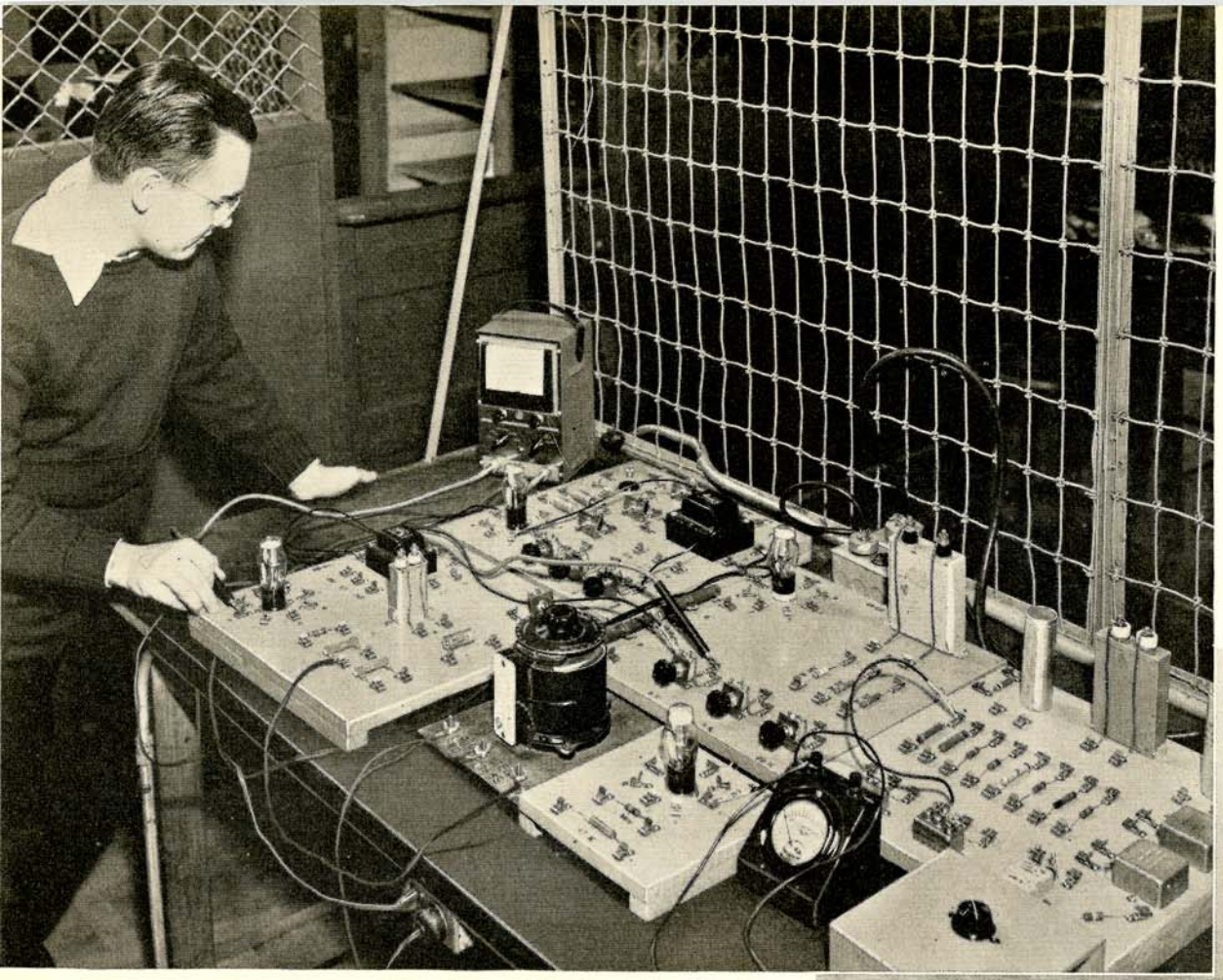
Amplifier Performance Test

Another experiment for the electronic student is that of amplifier response analysis. The picture shows students testing the frequency, phase, and non-linear distortion of electronic amplifier stages. In one application of the method a square wave signal is fed through the amplifier under test, and a picture of the output signal is obtained on the cathode-ray oscilloscope. By comparing the deviation of the output signal from the original, the response of the amplifier is obtained. By substituting a sine wave for the square wave, determination of the non-linear distortion may be obtained.



Determining Tube Characteristics

An important phase of the study of electronics is the characteristics of the triode. In the experiment pictured here the student is obtaining the plate characteristics of a high vacuum triode, the purpose being to determine the characteristics of the tube. The static plate characteristics of a high vacuum triode are obtained by connecting the tube into a DC circuit so that its plate voltage and grid voltage may be varied, and readings are then taken of the corresponding plate current. A family of curves of plate currents versus plate voltage for the different values of grid voltage are plotted.

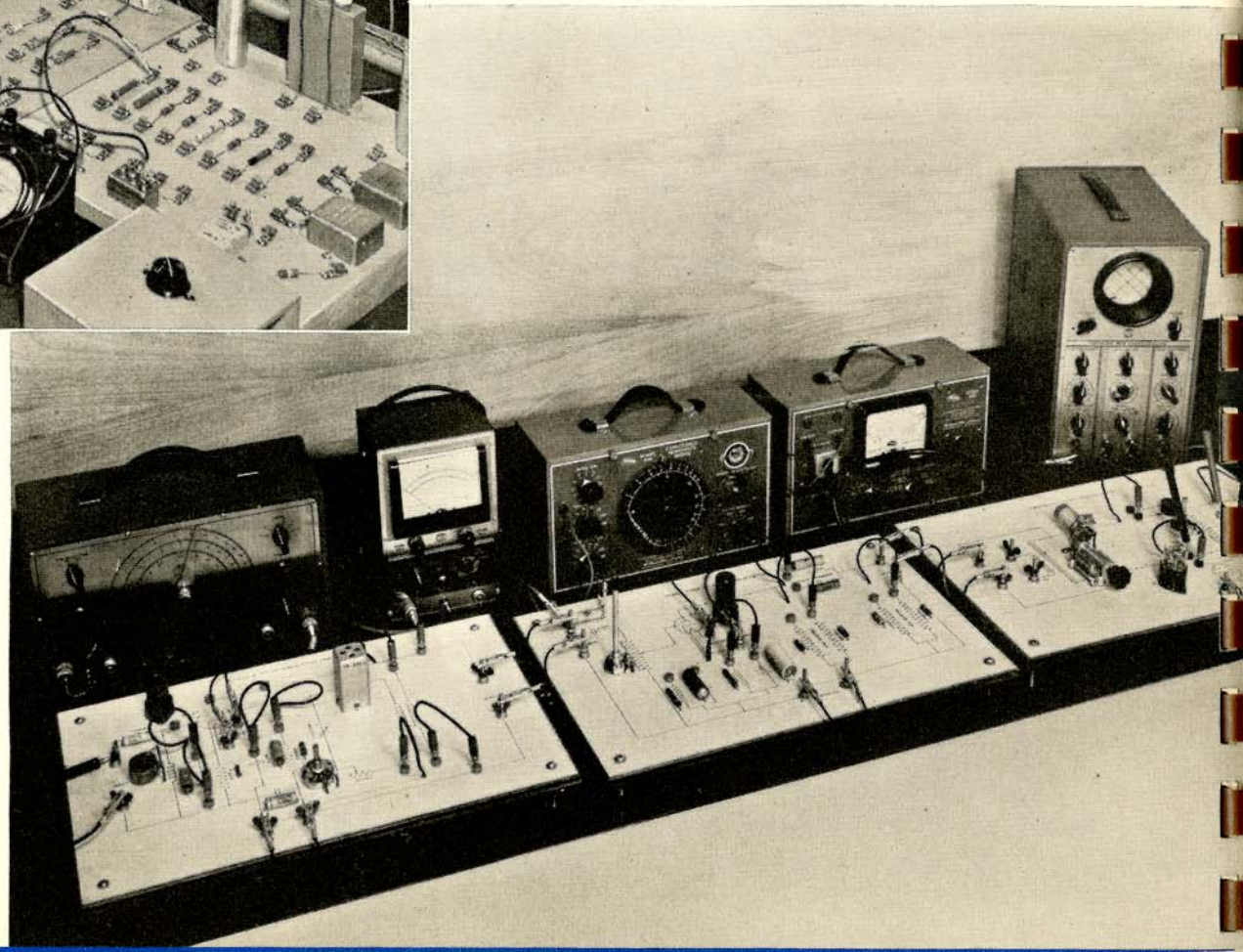


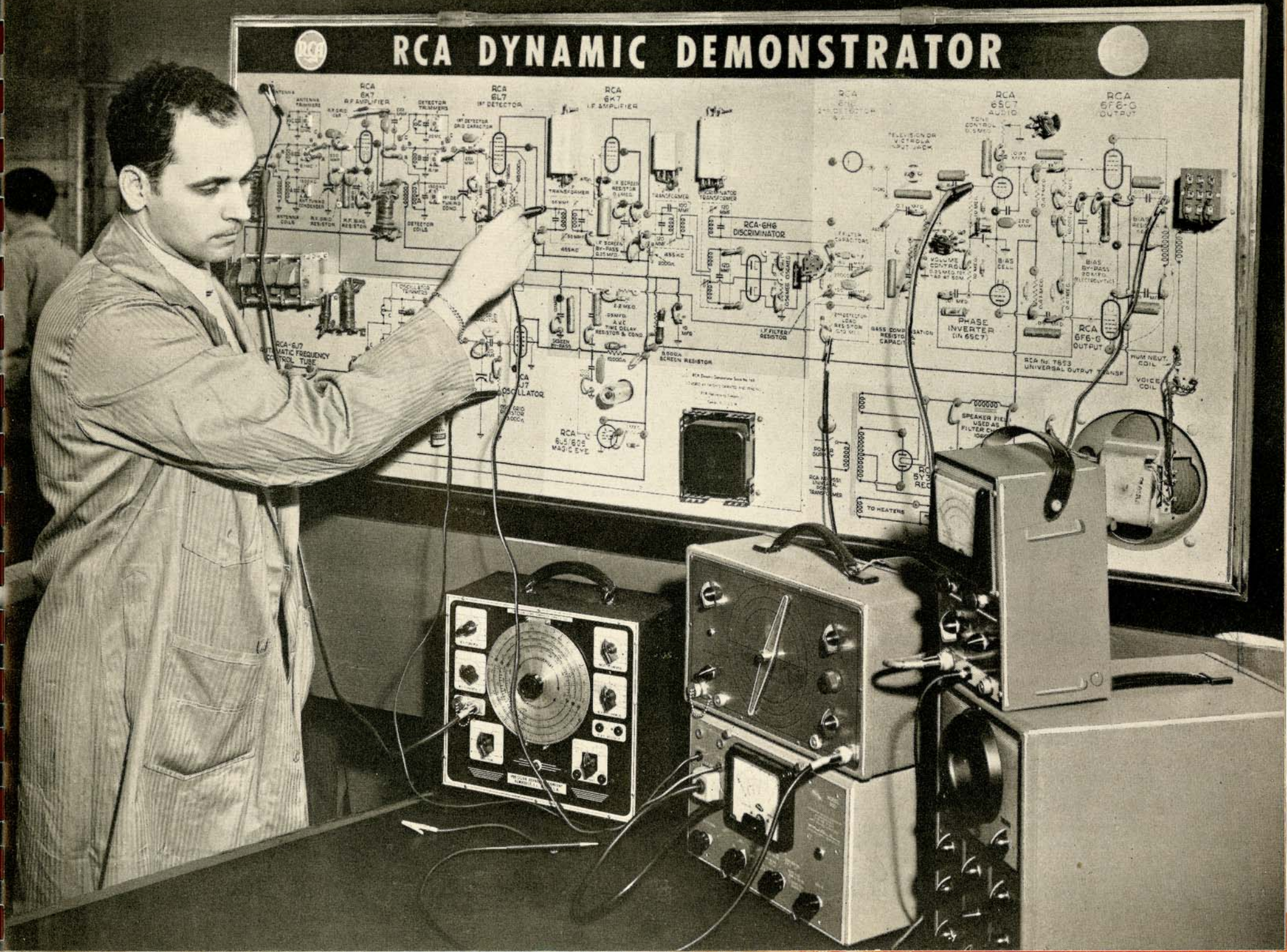
Converting Electric Power

The picture opposite shows a display of test boards consisting of a rectifier, inverter and an electronic wattmeter. The rectifier converts alternating current into direct current; the inverter changes direct current into alternating current; and the electronic wattmeter measures the power flow in a circuit, a principle based on square law tube characteristics. The display is set up to represent a transmission system on a small scale. The electric power is first converted by the rectifier circuit from AC to DC, and sent over a distance. At the terminal point of the transmission line the inverter changes the DC to AC for industrial or domestic use. The electronic wattmeter measures power input to the line and the power output at the terminal point.

Testing Radio Components

Another display of electronic equipment shows a radio frequency amplifier, an audio frequency amplifier and a radio frequency detector. These three circuits represent the three main sections of a radio receiving set in its most elementary form. First of all the radio frequency amplifier takes the incoming signal from the aerial, amplifies it, and sends it on to the second stage. The radio frequency detector rectifies and filters the signal, and reproduces the audio frequency signal originally present in the microphone circuit at the transmitter. The audio frequency amplifier then further amplifies this audio signal. The signal may then be sent to a set of earphones or to a loud speaker, where the original speech or music is reproduced.




RCA DYNAMIC DEMONSTRATOR
RCA 6K7 RF AMPLIFIER
RCA 6L7 1ST DETECTOR
RCA 6K7 I.F. AMPLIFIER
RCA 6SC7 AUDIO
RCA 6F6-G OUTPUT
RCA-6H6 DISCRIMINATOR
PHASE INVERTER (IN 6SC7)
RCA 6F6-G OUTPUT
RCA 6-E-5/6OS MAGIC EYE
TO HEATERS
VOICE COIL

Progress in Radio and Electronics

Radio

When broadcasting of voice and music first startled the world, the widespread demand for reception equipment knew no bounds. Almost overnight a huge industry was born.

Today radio is a vast industrial empire. And with this new era of advanced knowledge and technique has come an active demand for able men to handle the technical phases of radio application. These men, by virtue of their proficiency in theory and practice of electricity as it is in radio, will advance the design and production of radio equipment to ever-increasing standards.

Even though tremendous strides have been made in radio, the industry is still in the development stage. Many elements of radio construction will undergo constant change and improvement. Keen-minded, educated, trained service men, technicians, and engineers are needed to carry on this work. The Milwaukee School of Engineering offers students, by actual experience in the operation of and experiment with apparatus and materials, the technical skill necessary to meet the demands of the growing radio industry.

The present trend in radio is to use ultra high frequency, especially with the advent of frequency modulation and television. This range of ultra high frequency demands different techniques and approaches than the low radio frequencies required.

Electronics

To the average man electronics is a strange, awe-inspiring, almost mystical new science; unknown, because it is symbolized by the mysteries of atomic structure.

Yet there are many familiar applications of electronic development which provide better living and new enjoyment for all — developments which are the results of the application of the knowledge and training of skilled technicians.

The electronics' age began during World War I with the development of radio. Soon radio communication passed from the laboratory stage to a practical science, and a great new industry sprang up. Talking movies were developed, and television has been perfected to revolutionize the entertainment world.

From radio research have come industrial applications of tremendous importance — high frequency heating, power system control, heating and air conditioning applications and control, printing, welding control, invisible rays, and many others.

No one can foretell what new peacetime industries, made possible by electronics, will be born out of the research and engineering laboratories of America today, to furnish employment and enjoyment to millions. New secrets of the human body will be discovered by the scientist and surgeon. The housewife will find her work easier and more enjoyable. Industry will be able to produce new and better products.

The future of electronics is limited only by the imagination and skill of man in putting the tiny electron to work. The list of possible electronic applications is endless. The following pictures provide a brief view of what the electronic technician is capable of performing because of the intensive training received at the Milwaukee School of Engineering.